

Exploring Word Fields Using the Free-Sorting Method

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Abstract

Centering on German self-motion verbs, this paper demonstrates the advantages of free-sorting over creating and delineating word fields with more traditional methods. In particular, I draw a comparison to Snell-Hornby's (1983) work on German descriptive verbs, which produces lexical fields with the help of dictionary entries, a thesaurus, a small corpus of written text and limited speaker feedback. While these methods have benefits, they are limited in their ability to represent the average organization of semantic fields in the mind of everyday speakers. Free-sorting, by contrast, does not rely on academic resources, corpora or singular speaker judgments. In sorting, a group of informants creates visible sets of items according to perceived similarity. Psycholinguists have used the method to quantitatively explore the perception of color terms across cultures (c.f. Roberson et al. 2005). With a sufficiently large number of informants, one can generate lexical sorting data that is apt for cluster analysis, the results of which are represented by dendrograms. The experiment I conducted involved 33 school children from a middle class neighborhood in Braunschweig, Northern Germany. My experiment shows that Snell-Hornby's (1983) representation of the self-motion field can be improved by integrating further dimensions of meaning, such as body-space relations and sound, that young speakers find salient in the grouping procedure.

1 Introduction

This paper suggests a procedure for quantitatively exploring lexical fields in a language or variety while relying on cognitively salient, semantic distinctions made by a substantial number of speakers in a group. By allowing them to sort and arrange words by perceived semantic similarities and by calculating clusters of verbs that most often co-occur in such a free-sorting test, one arrives at a result that is more representative of a speaker group's actual understanding of words in a certain field than by using dictionary definitions or text corpora. The method and its future development could also lead to valuable contributions with regard to a current bottleneck in language technology: the development of lexical semantic resources with (a) sufficiently large vocabularies and (b) a good representation of the semantic relations between words and word fields that are immediately accessible to speakers. Tackling these issues has relevance for translation devices, automatic text interpretation, dictionary applications and language learning. Projects such as WordNet (Miller 1995, Fellbaum 1998) and FrameNet (Ruppenhofer et al. 2010) are dedicated to developing large databases of lexical entries and semantic relations, in order to provide a basis for research in these areas. However, like many other approaches, these resources are based on dictionaries, thesauruses and text corpora – all

of which require academic individuals to make ultimate judgments over similarity and relatedness. An overview of traditional approaches is offered by Budanitsky & Hirst (2004:14-17) who evaluate five different WordNet-based measures of semantic relatedness by comparing them to human ratings and by testing their performance in application. The authors preface the comparison by stating that “insofar as human judgments of similarity and relatedness are deemed to be correct by definition, this clearly gives the best assessment of the ‘goodness’ of a measure” (Ibid:23). At the same time, they list a number of severe methodological drawbacks that ultimately shake their confidence in the comparison: often data sets are unreliably small to be subject-independent, the experiments are difficult to design and stimuli in form of words are problematic when the goal is to better understand concepts (see Section 4 of this paper).

Human judgment of similarity as a resource for creating good measures of similarity remains to be fully tapped. The goal of this paper is to offer a methodological suggestion towards making experimental data more easily attainable, and perhaps circumventing some of the issues mentioned above. To this end I will conduct a free-sorting test of German self-motion verbs with school children and draw an initial comparison with the diagrams of German self-motion verbs in Snell-Hornby (1983). This dictionary and corpus-based work involved a very limited number of native speakers commenting on perceived semantic differences.

The paper is structured as follows: I will compare motion verbs of English and German to exemplify some of the differences that exist in word fields even between closely related languages. In section 2, I will discuss Snell-Hornby’s (1983) approach to the structural differences of English and German word fields. For the rest of the paper I will focus on German to show how German lexical fields may be better described using experimental and quantitative methods rather than traditional means. Section 3 gleans the idea of a free-sorting test from research on word categorization, cross-cultural color perception and cross-linguistic color terminology. Here, I discuss the advantages and drawbacks of the free-sorting method for an investigation of word fields. The method of the free-sorting test as applied to German motion verbs and conducted with children at a school of a mid-sized city in Northern Germany is presented in section 4. Section 5 presents the results of this study and section 6 contains a comparison of these free-sorting results with the suggestions of Snell-Hornby. The conclusion and an outlook on future research form the last section of the paper.

2 Semantic differences: the example of “crawling” in German

Even when they are considered to cover similar meanings, individual lexical terms across languages differs substantially with regard to the way they map onto perceived concepts in the world. This holds for single terms and by extension for the composition of lexical fields. The field of motion verbs in German and English, two languages from the Germanic branch of IndoEuropean, offers a point in case. At an individual level, the verbs “to crawl” and *krabbeln* “to crawl with 4+x feet” share an etymological root, and yet have come to cover quite different meanings over time: the crawling action in English is broadly defined and can be applied to all situations exemplified in (1)-(3) below.

- (1) His son is crawling around everywhere.
- (2) Snakes sometimes crawl through the cracks.
- (3) The couple waited patiently for the old man to crawl past the checkout.

Of the three sentences, only (1) can be translated into a German sentence that uses the German verb *krabbeln* with an equivalent meaning. Because *krabbeln* involves at least four feet (and more in the case of most insects), it cannot be applied to snakes in (5) or the slowly moving elderly man in (6). Alternatively, the verbs *kriechen* ‘to crawl along the floor’ and *schleichen* ‘to sneak’ (or better ‘to move silently and slowly’) can be employed in the translation.

- | | | | | | | |
|-----|------------------------------------------|------|----------|------------|--------|--|
| (4) | Sein | Sohn | krabbelt | überall | herum. | |
| | POSS.3.m | son | crawl | everywhere | around | |
| | ‘His son is crawling around everywhere.’ | | | | | |
-
- | | | | | | | |
|-----|----------------------------------------------|----------|-----------|---------|-----|---------|
| (5) | Schlangen | kriechen | manchmal | durch | die | Ritzen. |
| | snakes | slither | sometimes | through | the | cracks |
| | ‘Snakes sometimes crawl through the cracks.’ | | | | | |
-
- | | | | | | | | | | | |
|-----|---------------------------------------------------------------------------|--------|--------------------|-----------|-------|-----|------|------|----|-----|
| (6) | Das | Paar | wartete | geduldig | bis | der | alte | Mann | an | der |
| | DET | couple | waited | patiently | until | the | old | man | at | the |
| | Kasse | | vorbei-geschlichen | war. | | | | | | |
| | checkout | | past-sneak.PST | AUX.PST | | | | | | |
| | ‘The couple waited patiently for the old man to crawl past the checkout.’ | | | | | | | | | |

While these considerations examine the individual word level, they imply consequences for the level of the whole field of motion verbs in German: the fact that *krabbeln* does not cover the same meaning as ‘to crawl’ also leads to differences in meaning between a verb like *schleichen* and its apparent English equivalent ‘to sneak.’ The actual definition of *schleichen* would have to include a notion of slowness which is missing from the English word ‘to sneak.’ The fields of motion verbs in English and German therefore overlap but cannot be directly mapped onto each other. The next section shows how Snell-Hornby (1983) compared precisely how English and German descriptive verbs differ and visualized such differences between subfields in field diagrams.

3 Snell Hornby (1983)

The previous comparison of German and English self-motion verbs led me to compare lexical entries in FrameNet, an English resource for the analysis of conceptual relations based on the British National Corpus, with those in SALSA, a German resource reapplying ‘frames’ of FrameNet to a corpus of German newspaper articles (Burchardt et al. 2006). However, a comparison of lexical entries quickly proved impossible due to a

lack of many motion verbs in the German newspaper sources. A more traditional translation resource proved more reliable for a comparison of verb fields, even if some verbs were not shared with my data and vice versa: Mainly with the goal in mind of providing semantic maps for translators, Snell-Hornby (1983) set out to organize and compare word fields of so-called “descriptive verbs” in English and German. In both languages, descriptive verbs are verbs that “describe rather than state an action” (Snell-Hornby 1983:15). The category of motion verbs would include verbs like ‘to crawl,’ ‘to hop,’ ‘to sneak’ or ‘to run.’ The core notion of descriptive verbs is the ‘act-nucleus’, which is surrounded by a descriptive, modifying complex of elements, termed the ‘modificant.’ The non-core elements can be semantically extracted from the core: for example, by decomposing the descriptive verb *schleichen* ‘to sneak’ into a nucleus of motion and several modificants, we arrive at a separation of the pure motion event and the modifying mannerisms that define part of the German concept.

- (7) Der Mann schleicht.
the.m man sneaks.

‘The man is **sneaking**.’

- (8) Der Mann bewegt sich leise, vorsichtig und langsam.
the.m man move himself quietly carefully and slowly.

‘The man is moving quietly, carefully and slowly.’

Leise ‘quiet’, *vorsichtig* ‘careful’ and *langsam* ‘slowly’ are some, but not all of the modificant’s components. Arriving at an exhaustive list of modifying elements within a language is difficult because there are many ways in which modifiers operate and are perceived. The decomposition of (7) into (8) showcases how descriptive verbs can include a modification of the agent and/or of the action itself. In cases of ‘direct descriptivity’ the action itself is modified in the description. ‘Indirect descriptivity’ applies when the modification occurs by way of an agent, as with the word *vorsichtig* ‘careful’ which denotes someone moving with care. The verb *schleichen* shows that the direct and indirect perspectives can thus be combined in the modificant of a descriptive verb.

Crucially, modificants are also subject to the speaker’s judgment and perception: there is no single possible interpretation of a modification. With regard to motion verbs, Snell-Hornby notes, for instance:

The speed norm is among the most common of such individually set norms in verb-descriptivity, whether the action is experienced as being slow, as with *dawdle*, *trödeln*, *plod* and *bummeln*, or as being excessively fast, as with *rush*, *dash*, *rasen* and *sausen*. (Snell-Hornby 1983:38)

In other words, how a speaker actually perceives the speed of a motion event influences their description of the event. Accordingly, individual speakers could employ different descriptive verbs for the same event or interpret the same descriptive verb in a different way. In her effort to discover structure and order in the relationships between

words in the field of descriptive verbs, Snell-Hornby consulted two dictionaries (Duden and Wahrig), a thesaurus (Egger), and a corpus with around 15 sentences per target word. She also consulted three native German speakers (two of which had an academic background) as she created the German verb fields.

‘Subfields’ are the smallest field-unit Snell-Hornby (1983) introduces. For instance, the major field of ‘Movement and Position’ contains the areas of ‘Walking and running’ and ‘Movement in air and water’ and ‘Static and negative.’ (See Figure (1) below).

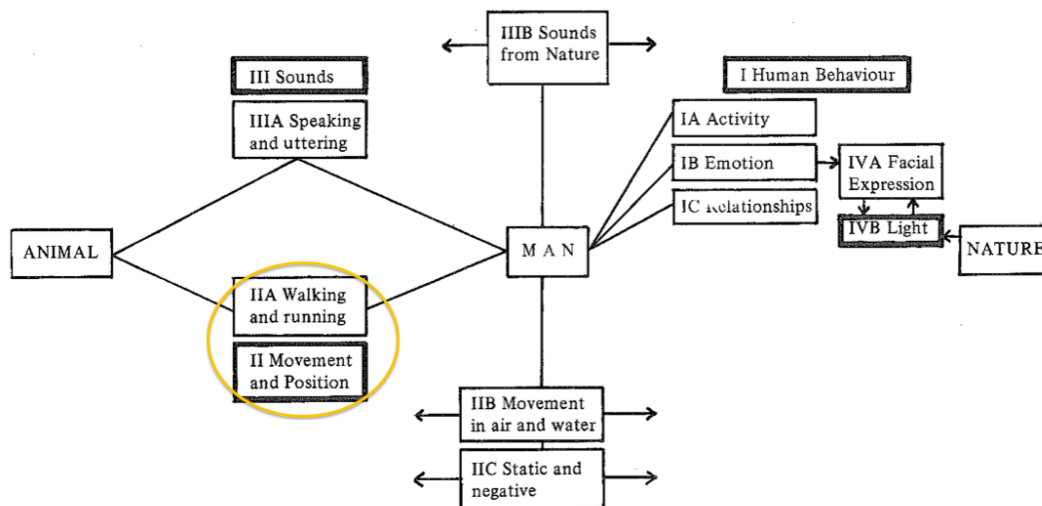


Figure 1: Overview of major fields and areas of descriptive verbs in Snell Hornby (1983) with focus on Major Field II and Area IIA.

Figure (2) shows that the area of ‘Walking and running’ contains four subfields, namely ‘Leisurely, aimless’ ‘Measured, laborious,’ ‘Clumsy, unsteady’ and ‘Nimble, with energy.’ The diagram of the third subfield is presented as an example in Figure (3) below. The arrows represent relationships between the clusters within the subfield. Although the meaning of these arrows is not further specified by Snell-Hornby, they can be intuitively understood to point to an intensification or shift in the modificant. For instance, the largest cluster in Figure (3) consists of the verbs *watscheln* ‘to waddle,’ *torkeln* ‘to stagger,’ *taumeln* ‘to totter,’ *wanken* ‘to reel’ and *schwanken* ‘to reel’ (all translations approximated). To the right we find the verb *stolpern*, which means ‘to trip, to stumble.’ Further to the right we read *hinken* and *humpeln* which both mean to ‘to limp, to hobble.’ The arrangement can therefore be understood as an intensification of the unsteadiness inherent to the verbs in the largest cluster.

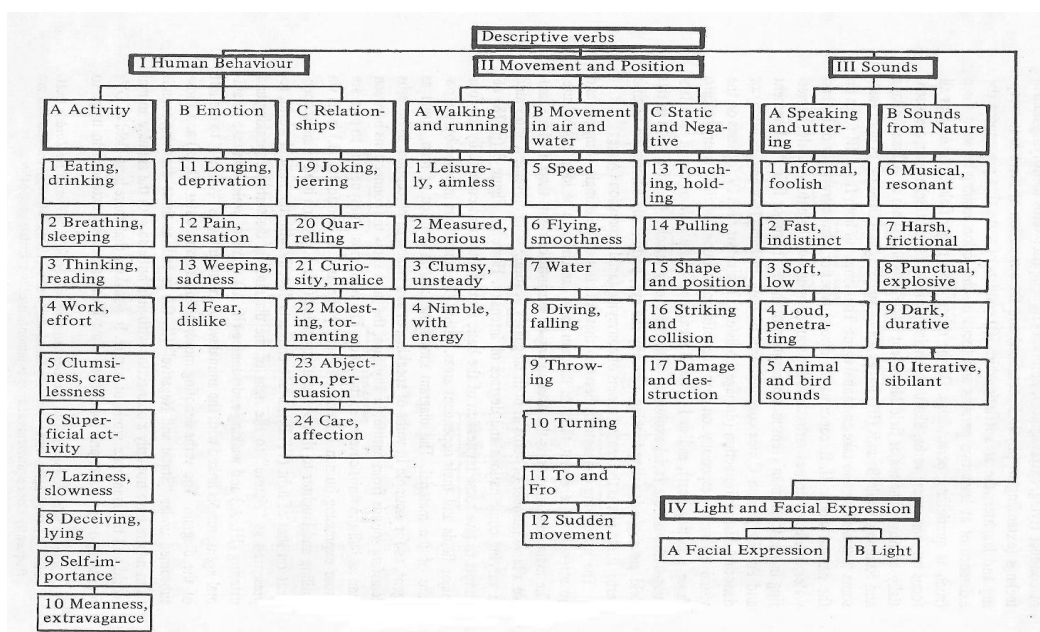


Figure 2: Overview of major fields and areas of descriptive verbs in Snell Hornby (1983)

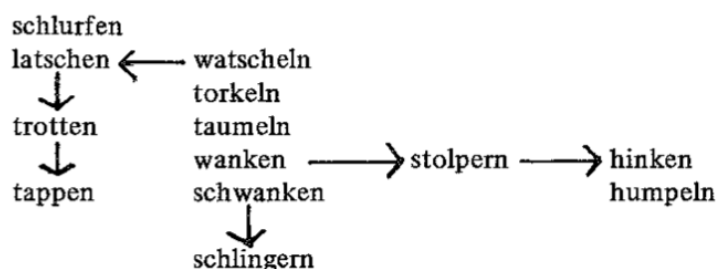


Figure 3: Snell-Hornby's (1983) subfield 'Clumsy, unsteady'

The four subfields under the area 'Walking and running' have in common, that they only contain self-motion verbs. Another subfield of self-motion verbs, namely 'Speed,' is placed somewhat counter-intuitively under the area 'Movement in Air and Water.' For the purposes of this paper, it makes sense to limit the examination of German motion verbs to these five subfields. The main reconsideration of Snell-Hornby's work that I suggest is the choice of sources that are supposed to establish these subfields. Relying on dictionaries, thesauruses, written text corpora and individual speaker judgments may be a good starting point when approximating the structure of the Standard German motion verb lexicon of upper and middle class adults, but for the same reason Snell-Hornby's results do not necessarily reflect the lexicon as it is cognitively structured for a majority of speakers. Rather, she presents hypothetical cardinal clusters in these diagrams that call for further verification. Lexical tests across social groups, dialect regions or age groups

may actually lead to very different representations of the same major fields or areas.¹ A fundamentally different way of arriving at representations of word fields would be to shift from individual sources to a quantitative study that actually elicits speaker choices. The next section discusses how this idea arose and what adaptations were necessary to create my study.

4 The word-color analogy

My project of taking self-motion verbs to an elementary school in a middle-class neighborhood in a Northern German city where fourth graders sorted the verbs by perceived similarity, was inspired by Snell-Hornby's (1983) own analogy between word fields and color terms. In her work, she alludes to the color continuum which according to Berlin & Kay (1969) consists of "focal areas, blurred edges and overlappings" (Snell-Hornby 1983:68). Analogous to the color continuum, descriptions of motion types contain focal areas (core notions) such as 'to walk' or 'to run' that are salient in their difference across languages, apparently based on universal principles. At the same time, there are blurred edges (hazy or non-prototypical modificants) that give witness to substantial differences in the way motion types are perceived across cultures, as with the verb 'to crawl,' discussed above. Just as color cards help us visualize the solid and fluid components of continuous color fields, Snell-Hornby's field diagrams break down the complex field into atomic units and relationships.

Two issues arise, however: first, Snell-Hornby excludes generic verbs (such as 'to walk' or 'to go') from her fields for reasons that are unclear. She appears to avoid generic verbs because they are not *per se* descriptive. One could argue, however, that her subfields are incomplete without the focal notions that generic motion types provide. Excluding them from the field analysis amounts to excluding focal colors from the color continuum. Consequently, a 'core notion' cannot be contrasted with a more heavily modified type. In my own study, I therefore included generic verbs such as *gehen* 'to walk,' *laufen* 'to walk, run' and *kommen* 'to come' along with descriptive verbs.

Another problem is that Snell-Hornby (1983) does not employ experimental methods that support her classification. Again, research on color perception used in relativity research could serve as the basis for solving the issue. One experimental method, in particular, appears nicely transferable: with the goal of better comprehending focal points and borders in color perception and color terminology across languages and cultures, Roberson et al. (2005) conducted a free-sorting task of color squares with speakers of 17 distinct languages and cultural backgrounds. Participants freely grouped color terms "so that ones that looked similar were placed together in the way that members of a family go together" (Roberson et al 2005:9). The reasoning for using unconstrained free-sorting in this task was that it allowed for a comparison of naming practices without limiting possible groupings of colors, and the potential relationships between them. Roberson et al. found "evidence of both broad generalities of grouping behavior... and of some systematic differences." (Ibid:19). The existence of focal colors was confirmed due to a

¹ Such an application of the free-sorting method is presented in Huenlich (forthcoming), but has not been included in the scope of this paper.

broad generality of sorting behavior across participants and languages. At the same time, there was strong variability between individual speakers, and also a genuine influence of sorting behavior due to learned color categories. In other words, there was an interaction of universal, individual, and sociolinguistically-acquired influences.

Applying Roberson et al.'s method to the problem of establishing word fields requires several adaptations. In order for speakers to make grouping decisions, the test would have to use written words or phrases. If speakers process written language in a fundamentally different way from spoken language, or if a word categorization task is by default not representative of actual conceptual categories this adaptation would be problematic. Nevertheless, sorting of written word stimuli into categories of semantic similarity has been widely applied in psychology and psycholinguistics. The experiments span from testing recall and recognition (e.g. Mandler et al. 1969, Schwartz & Humphreys 1972), to determining human "synonymy judgements" (e.g. Rubenstein & Goodenough 1965, Miller & Charles 1991). All these attempts appear problematic, due to the possible effect that "the dominant sense of the target words or mutually triggering related senses" influences participant choices, so that the actual interest in research, namely the "relatedness of word-senses" is obscured by the word stimuli, which "are merely surrogates" of meaning (Budanitsky & Hirst 2004: 32). This paradox appears to be an insoluble problem. It may be mitigated though in two ways, though.

First, many of the traditional experiments limit the conditions under which participants judge similarity: they are either asked to decide over an extremely limited number of cases, such as word pairs or word clusters (e.g. Rubenstein & Goodenough 1965, Miller & Charles 1991, Divjak & Gries 2007) or they are prompted to create a limited number of categories (e.g. Rosenberg & Kim 1975:491, "a minimum of 2 categories and a maximum of 15"). Of course, research design is usually geared towards specific research questions. However, when applied to similarity measures, such restrictions may exacerbate the effect of a "dominant sense" of a word over other possible senses or relationships. Leaving the decision of the number of categories in sorting completely up to the test-takers, as Roberson et al (2005) did in their color experiment, and not forcing speakers to create any specific number of categories can allow for the most salient meaning or relationship to emerge across the decisions of a large enough group of participants.

Second, it may actually matter, who the experiment is conducted with. I chose to test students in a school setting: students deal with written language on a daily basis and are familiar with tasks that use written words to refer to spoken language and conceptual categories. It can also be assumed the children in a Western school are accustomed to making distinctions based on categories of meaning, regardless of whether categories influence naming practices, or whether naming practices are the basis of categorizations. It is also established that category creation and word learning go hand in hand as children mature, more generally speaking. The so-called 'naming spurt', a major leap in vocabulary acquisition at around 18 months, is attributed to this relationship (Gopnik & Meltzoff 1997). Making inferences about conceptual organization based on a written test, therefore seems valid for this group.

A separate problem could be that students are unlikely to visualize motion events the same way when a written prompt merely contains the infinitive verb form. I used a

simple sentence frame, to present the data with more context, making clear that all cards represent self-motion events with a mover involved.

A final problem I anticipated was that speakers may simply not know certain words. Not being able to decide on a color label is a fundamentally different problem for the final sorting result, because a speaker may still decide one way or another. Participants in a word sorting task could, however, end up with words that are completely opaque, so that results become skewed. To prevent this, I included pseudo-verbs (verbs with no meaning) in my study and asked participants to sort all unknown verbs onto a separate stack. This way the results not only give an impression of the structure of the actual field of self-motion verbs, but also of the scope of verbs that were known to my participants, who were students in their final year of elementary school at the time of the test.

5 Methodology

5.1 Participants

I tested the field of German self-motion verbs with 29 fourth graders² (10-11y) from three different classes at an elementary school in the mid-sized German city of Braunschweig (253,000 inhabitants), about 2 hours from Berlin in the federal state of *Niedersachsen* (Lower Saxony). The neighborhood from which all participants came from is a middle class neighborhood with around 6000 inhabitants. Basic background information was provided: all participants were monolingual, born in Germany and most were raised in Braunschweig. Several children in the school have parents who are academics and work in a nearby research facility.

5.2 Verbs

To keep the free-sorting task manageable, I had to limit the number of verbs. Snell-Hornby (1983) mentions over 60 self-motion descriptive verbs, but my final list only includes 38 of this type. I decided to add generic verbs, and also included words that are more frequent in written and spoken Standard German. Table 1, below, contains the final 52 self-motion verbs I chose for unconstrained free-sorting, along with the three pseudo-verbs that I created for control purposes. The translations are loose approximations to the meaning covered by the German verbs.

² Originally, there were 33 test-takers. However, four students had to be excluded due one student getting distracted and three students losing cards during the sorting procedure. Such losses could be seen as a disadvantage of conducting the experiment in a school or with children.

German Verb	Translation	German Verb	Translation
bummeln	‘to saunter’	schlendern	‘to saunter’
eilen	‘to hurry’	schlurfen	‘to shuffle’
flanieren	‘to stroll’	schreiten	‘to stride’
flitzen	‘to whisk’	spazieren	‘to stroll’
gehen	‘to walk, go’	springen	‘to jump’
hasten	‘to hasten’	sprinten	‘to sprint’
hechten	‘to jump’ (like a pike)	spurten	‘to spurt’
hinken	‘to limp’	stampfen	‘to stomp’
hoppeln	‘to scamper’	stapfen	‘to trudge, tramp’
hopsen	‘to skip’	steigen	‘to mount, rise’
hüpfen	‘to hop’	stiefeln	‘to march’
humpeln	‘to hobble’	stolzieren	‘to strut’
huschen	‘to whisk’	tappen	‘to toddle’
joggen	‘to jog’	taumeln	‘to totter’
klettern	‘to climb’	tippeln	‘to pad’
kommen	‘to come’	torkeln	‘to stagger’
krabbeln	‘to crawl’	traben	‘to trot’
kraxeln	‘to scramble’	trampeln	‘to trample, stomp’
kriechen	‘to creep’	trotten	‘to tread heavily’
latschen	‘to shamble’	wandern	‘to hike’
laufen	‘to go, walk, run’	wanken	‘to reel’
marschieren	‘to march’	watscheln	‘to waddle’
purzeln	‘to somersault, tumble’	wetzen	‘to speed, race’
rasen	‘to race’		
rennen	‘to run’		
robben	‘to crawl’ (like a seal)	Pseudo-verbs:	
rollen	‘to roll’	53. schlopern	
sausen	‘to dash’	54. somen	
schleichen	‘to sneak’	55. workeln	

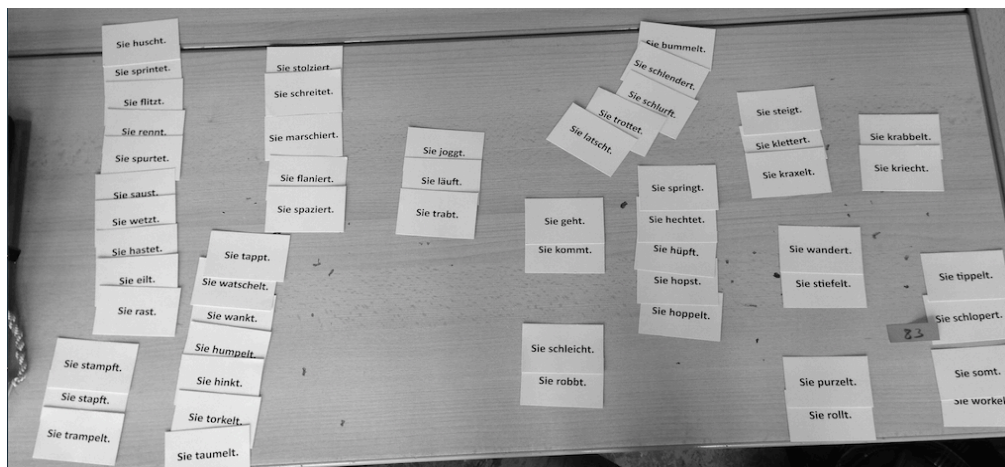
Table 1: List of 52 verbs and 3 pseudo-verbs used for free-sorting

5.3 Procedures

I prepared students with a hands-on example of sorting, and presented them with five German verbs of emotion on a blackboard, namely *Sie lacht*. ‘She is laughing,’ *Sie weint*. ‘She is crying,’ *Sie lächelt*. ‘She is smiling,’ *Sie grinst*. ‘She is grinning,’ *Sie heult*. ‘She is weeping.’ I also included the meaningless pseudoverb sentence, *Sie bammert*. ‘She is bammering.’ Students were asked to group the verbs by perceived similarities. All students agreed that there was a perceivable group of ‘happy’ vs. ‘sad’ verbs in the example, but they could not categorize the pseudoverb. I told students I had ‘tricked’ them and that they were to put verbs that have no meaning on a separate stack when coming across such words in the task ahead. The precise instructions students were then given with regard to the sorting task were

- (a) to sort the cards into groups that “fit” together, and

- All verbs were presented in a sentence frame with the third person feminine singular present tense form, e.g. *Sie rennt*. - “She is running.” This provided a uniform context for students. The short sentences were printed on white business cards of solid paper with 8.5 cm length and 5 cm width. Free-sorting took place on large school tables, with enough space to ensure every student could arrange clusters freely without interfering or interacting with others. My participants had 30 minutes to conclude the task, but no one took longer than 20 minutes. A colored sticker with the student’s number at the right corner of the table marked the area where students placed the perceived pseudo-verbs. If a student did not understand the instructions, they were repeated. Students used different strategies to reach their sorting goals: Some spread the cards out on the table, sorting out perceived pseudo-verbs first, and organizing the other cards afterwards. Others sorted the cards by working from a stack, subsequently creating new stacks. At the completion of the tasks, my assistant took pictures of each table. Figure 4 contains an example of the final sorting results. The pictures varied in their structure, but groups were generally identifiable. If a grouping appeared ambiguous, I consulted with my assistant, basing the final decision on the most probable intention of the student.



The pictures of students' desks were coded into a co-variation matrix, where a co-occurrence either equaled 1 (the verbs co-occur in a sorting group) or 0 (the verbs do not co-occur in a sorting group). Tables of all speakers were added up, divided by the total number of speakers and converted into Euclidean distances. These distances were used

for hierarchical clustering analysis (HAC) which leads to a dendrogram that serves the purpose of a field exploration. HAC can be conducted with different algorithms, resulting in different trees. I chose the ‘complete linkage’ algorithm for the following reasons: the algorithm creates clusters based on the longest distance between any two members of two clusters, thereby emphasizing outliers in the dendrogram and producing overall smaller, more compact clusters. The lowest nodes in all trees will be those with the most similarities in the distance matrix. Hence, they represent the words that were most commonly associated with each other. The higher the distance measure on the vertical axis the less reliable are the similarities between branches. Smaller groups minimize the blurriness in the dendrogram. Also, those clusters that students produced most consistently will result in outliers: they are very closely aligned and do not align with the other, more variable groupings in the data. Outliers should be immediately visible.

6 Results

Figure 5 below shows the dendrogram derived from the data of the 29 participants from Braunschweig. Boxes were placed around clusters to visualize similarity. Solid boxes cut off at the 0.5 mark of the distance axis, indicating that at least 15 speakers (around 50%) grouped these words together. In most of the cases between 20 and 28 speakers considered these pairs similar. Dashed boxes indicate looser but still visible clusters that branch off around the 1.5 mark. Greek letters to the left of the final nodes facilitate referencing the clusters in a summary of results. Clusters α , β , and γ were grouped together consistently across speakers and are the three major outliers in the dendrogram. For instance, cluster α contains a core of speed verbs, that can be roughly translated as *flitzen* ‘to whisk,’ *rasen* ‘to race,’ *sausen* ‘to dash,’ *rennen* ‘to run,’ *sprinten* ‘to sprint.’ The clusters that loosely surround this ‘fast core’ are slightly less speedy in nature, involving verbs such as *joggen* ‘to jog’ or *traben* ‘to trot’ above, and verbs such as *eilen* ‘to hurry,’ *laufen* ‘to run, to walk’ and *hasten* ‘to hasten’ below. They were not always placed in the same group with the ‘fast core,’ as the distances show. Overall, however, all verbs of this group co-occurred often enough for the algorithm to treat it as a cluster.

Cluster β is an outlier because it contains the three pseudoverbs that evidently were identified quite consistently. Also in the cluster is the rare and old-fashioned word *flanieren* ‘to stroll.’ A word from the Hamburg dialect of German, *wetzen* ‘to run,’ is placed above the cluster or off to the side of it. *Wetzen* ‘to run’ probably was recognized by some students since the Braunschweig is not too far from Hamburg and mutual influences between German dialects exist. Nevertheless it was often placed in the group of unknown verbs.

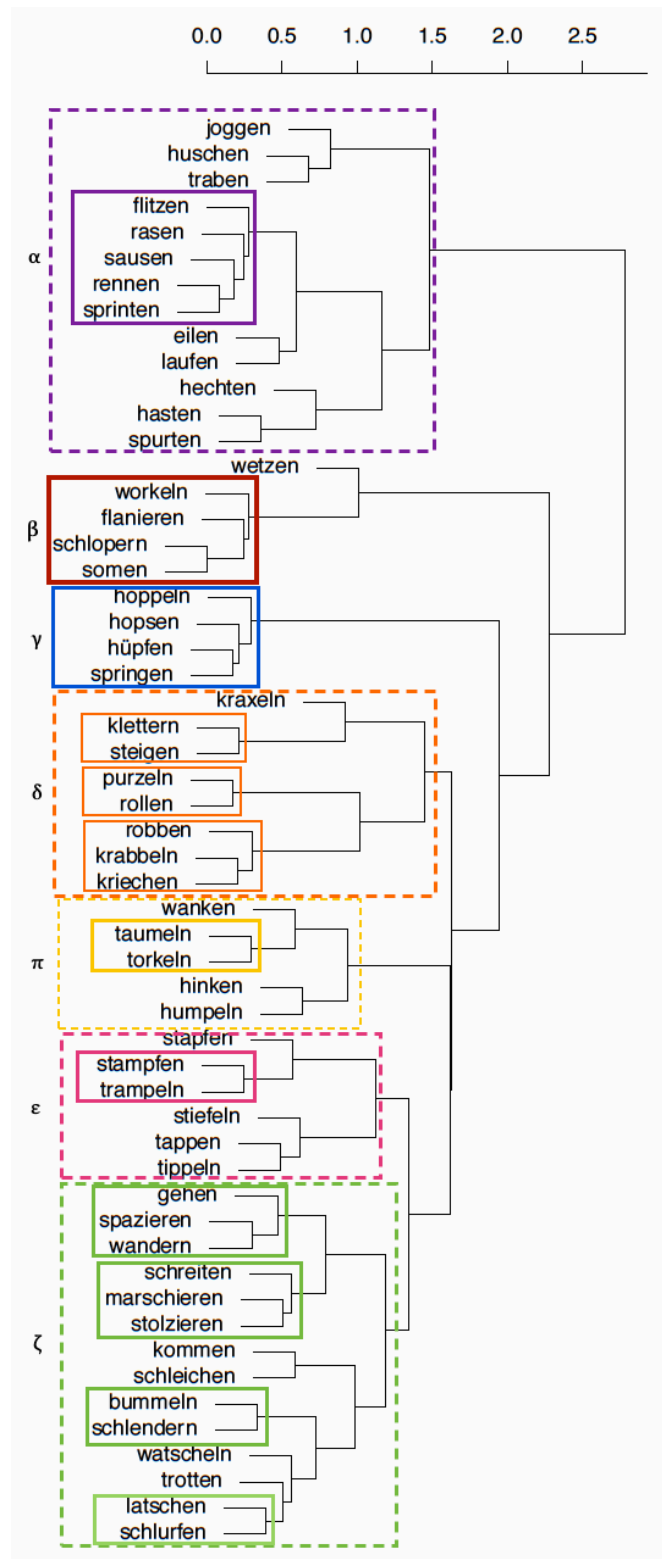


Figure 5: Dendrogram of self-motion verbs based on 29 students' free sorting results.

Cluster γ with the ‘jumping verbs’ *hoppeln* ‘to scamper,’ *hopsen* ‘to skip’ and *hüpfen* ‘to hop’ along with the more prototypical *springen* ‘to jump’ also forms a consistent outlier. The short distances between the verbs suggest that students identified this cluster consistently as a group.

Things get more complex for the remaining clusters δ , π , ϵ , and ζ . Cluster δ contains several core pairs that are separated by a distance of about 1 to 1.5, but nevertheless co-occurred often enough to be placed in a cluster together. The core clusters are *klettern* ‘to climb’ and *steigen* ‘to ascend, mount’ (with the adjacent verb *kraxeln* ‘to climb’), *purzeln* ‘to tumble, roll unsteadily’ and *rollen* ‘to roll,’ as well as *krabbeln* ‘to crawl with feet’ and *kriechen* ‘to creep, crawl on the floor’ (with the adjacent verb *robben* ‘to crawl like a seal’). All these verbs have in common that they do not denote regular upright motion types. One could posit that they are part of a group of verbs that participants perceived as ‘along the ground,’ or ‘involving hands and feet.’

Cluster π , labeled after the Greek word *πάροινος* ‘drunk,’ features a core cluster of verbs that denotes upright, but extremely instable motion events. The verbs *torkeln* ‘to stagger’ and *taumeln* ‘to totter’ with the adjacent verb *wanken* ‘to reel’ are all associated with lack of control in a motion event. The pair *hinken* and *humpeln* ‘to limp, hobble’ is more loosely affiliated with this core cluster, but the unsteadiness and insecurity involved in these injured motion types fits the same pattern and connotation of ‘lack of control.’

At the very bottom of the dedrogram we find twenty remaining verbs, that is, over a third of the verbs in the overall data set. This group fall into two or possibly even three major clusters. I decided to label them preliminarily as clusters ϵ and ζ , while the latter cluster may actually be further separated out.

Cluster ϵ appears to group together verbs that have an audible characteristic to them. The verbs *stampfen* ‘to stomp’ and *trampeln* ‘to trample’ together with the adjacent *stapfen* ‘to trudge, tramp’ all are motion types that require effort and produce noise. So does the verb *stiefeln* ‘to march’ that is often associated with military motion and is derived from the German word *Stiefel* ‘boot’. While involving less effort, the verbs *tippeln* ‘to pad’ and *tappen* ‘to toddle’ both also have an audible component – although with these verbs the characteristic noise is rather light, often surreptitious, but attention grabbing for precisely that reason.

Within the large cluster ζ , four core clusters stand out that are quite different in nature. The very first cluster involves rather generic motion types such as *gehen* ‘to walk, go,’ *spazieren* ‘to take a walk’ and *wandern* ‘to hike.’ All three simply denote a motion event – not a specific motion type. This unmarked group is juxtaposed with a cluster of verbs that are clearly descriptive: *schreiten* ‘to stride,’ and *stolzieren* ‘to strut,’ and *marschieren* ‘to march’ all convey a sense of pride and determination. The modification of the motion type to reach this state is, however, rather minor compared to all clusters above the generic group. Simply exhibiting a more decided gait (perhaps with a slightly lifted chin) might already be awarded with a description of this type in reports, poems or simple conversation.

The lower bundle of branches within cluster ζ , is headed by a somewhat puzzling pair: The verbs *kommen* ‘to come’ and *schleichen* ‘to sneak’ show up together here. Reasons for this co-occurrence are not altogether clear. Research I conducted with students with a migration background in an adjacent neighborhood suggests that

schleichen has an intentional and directional component to it that facilitates the pairing with a clearly directional verb such as *kommen* ‘to come.’ Perhaps the inclusion of *kommen* was not a good choice for this reason, because it brings in a component of directionality that is not found elsewhere in the data set.

As mentioned above, *schleichen* ‘to sneak’ has a slow modificant in German, similar to the verb ‘to crawl’ in English. It is not surprising therefore that the verb occurs close to a ‘slow’ core cluster: Right below it we find the verbs *bummeln* and *schlendern* which both denote a sauntering, slow motion event. The core cluster *latschen* ‘to shamble’ and *schlurfen* ‘to shuffle’ is accompanied by the more loosely associated verbs *watscheln* ‘to waddle,’ *trotten* ‘to tread heavily.’ All describe a motion event that is taking place and meets some sort of resistance, either of a physical or psychological nature. In any case, the last clusters all contain decelerated motion types.

7 Comparison with Snell-Hornby (1983)

From these results it already became clear that some of Snell-Hornby’s (1983) subfield categorizations are confirmed in the present data, while others differ substantially. The subfield ‘Clumsy, unsteady’ that was presented above in Figure 3, contains several verbs from cluster π , for instance – verbs that are commonly associated with lack of control in a motion event. However, the subfield also involves verbs from cluster ζ . My participants found this cluster more characteristic of slow motion types. An association with ‘clumsiness’ or ‘unsteadiness’ is not evident from the sorting results.

Other comparisons with Snell-Hornby’s (1983) suggested subfields and the dendrogram in Figure 5 point to similar commonalities and disparities. Largely compatible categories are found in the subfield ‘Speed’ and the cluster α , for instance. However, many of the speed verbs in my test are missing from Snell-Hornby’s analysis. This makes the comparison somewhat difficult. Yet, the similarities are tangible.

Snell-Hornby’s subfield ‘Leisurely, aimless’ presented below in Figure 6 contains a number of verbs that show up in cluster ζ and suggest similar grouping criteria: they are either generic or slow. The attribute ‘aimless’ actually characterizes the lowest portion of cluster ζ in Figure 5 very well. However, Snell-Hornby misses the component of slowness that permeates the field and leads to additions such as *schleichen* ‘to sneak.’

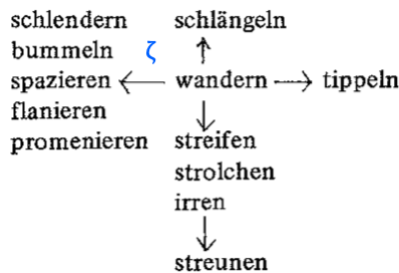


Figure 6: Snell Hornby’s (1983) subfield ‘Leisurely, aimless’ compared with the dendrogram in Figure 5.

Clear differences exist with regard to the subfield ‘Nimble, with energy,’ presented below in Figure 7. The clusters γ with the ‘jumping verbs’ and δ with ‘quadrupedal or ground’ motion types are both contained in this subfield, but are separate clusters in my participants’ sorting results. Interestingly, even Snell-Hornby (1983) cannot find a connection between these groups in her hypothetical subfield ‘Nimble, with energy,’ so that there is no connecting arrow between the two.

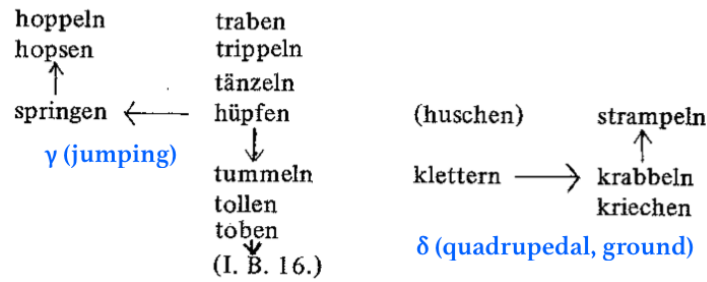


Figure 7: Snell Hornby's (1983) subfield ‘Nimble, with energy’ compared with clusters γ and δ in Figure 5.

Based on the results of free-sorting, it therefore seems reasonable to view cluster δ as a separate category from γ , even if the two clusters occur adjacent to each other in the dendrogram. The distance of the branches shows that the association between the two clusters is not very strong. Cluster δ appears to be salient not due to the energy level or ‘nimbleness’ involved in the motion event, but due to the way the motion is performed with a non-vertical body posture. Jumping is a different performance that involves two feet and an at least partially upright trajectory.

Another subfield that falls apart into two clusters in my data is presented in Figure 8: The subfield ‘Measured, laborious’ groups verbs that fall into the ‘noisy cluster’ ϵ and the miscellaneous cluster ζ . A closer look reveals that the verbs from ζ in this subfield are those with a modificant conveying ‘pride’ or determination. While it is reasonable how Snell-Hornby arranges these verbs and the cluster ϵ and ζ are also neighboring clusters in the dendrogram in Figure 5, the children's sorting results show that sound is a salient feature for them that has a stronger descriptive value than Snell-Hornby's characterization which apparently aims at qualities such as the difficulty and deliberateness of the performed motion.

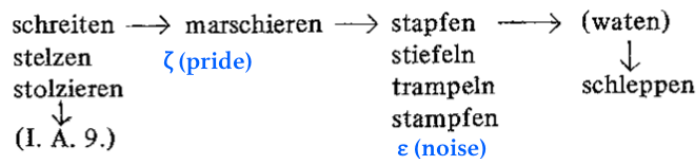


Figure 8: Snell Hornby's (1983) subfield ‘Measured, laborious’ compared with clusters ζ and ϵ in Figure 5.

We can summarize that while Snell-Hornby (1983) provides a preliminary overview of the way descriptive verbs in German might be organized, the experimental method

fine-tunes her suggestions considerably. The results that represent the way 10-11 year old native speakers of German perceive motion types differ almost always in favor of more fine-grained distinctions. In addition, they bring to our attention the important role of body-space relations (as in cluster δ) as well as of features such as speed (or the lack thereof in cluster ζ), and sound (as in cluster ϵ).

The next section concludes this paper by suggesting improvements to be implemented in future applications of the free-sorting method.

8 Conclusion and outlook

The method introduced in this paper should be seen as a first step in establishing fine-grained word fields through experiment rather than following intuitive academic or text-based choices. As such, the project leaves much room for refinement and improvement, and it would be problematic to regard the lexical fields of children as representative of all speakers of German. Every speaker group and speech community deserves its own test. What became clear from the test, however, is that traditional methods cannot claim to be representing lexical fields as all speakers see them. If Snell-Hornby's (1983) field categorization should be representative of Standard German, it would likely be necessary to conduct a free-sorting experiment with speakers that are most representative of this variety of German, such as adult academics from Middle and Northern German regions. I would assume that some of the differences found in the lexical organization of middle class children in Northern Germany would also be reflected in the way the adult lexicon in the same speech community is organized. But this needs to be verified in future research.

More generally speaking, there are many possibilities for improvement of the free-sorting test. For instance, test-takers could organize a lexical field online, so that all subsequent calculations are immediately automated. A computer-based test could also take into account metaphorical distances between clusters. In that case, the sorting test could also consider the possibility that word clusters may better relate to each other in three dimensional space – a feature that can be replicated on a testing screen. Multitudes of speakers (e.g. from a platform such as Mechanical Turk) could conduct a sorting experiment online, resulting in an immediately visible, highly reliable representation of the respective word fields. The resulting data could be used for multiple purposes, facilitating translation work, text interpretation and language learning. Also, where words are now used as sorting stimuli in experiments that are actually aimed at the organization of concepts, one could have speakers free-sort other stimuli (e.g. pictures, animations, videos snippets). This could possibly allow future research to circumvent the paradox that arises when words act as placeholders for concepts.

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